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FOREST RESOURCES of NORTH IDAHO

by

Henry J. Pissot

- Northern -
Rocky Mountain
Forest & Range
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Missoula Montana

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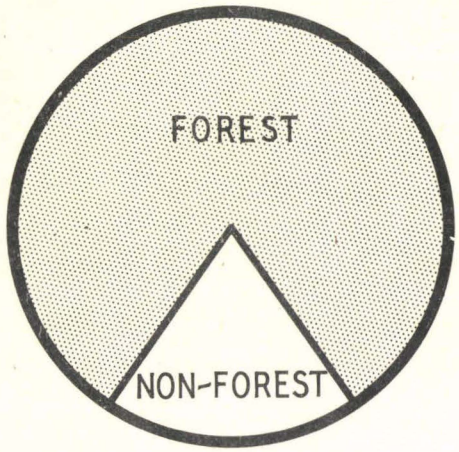
FOREST SURVEY IN NORTH IDAHO[1/]

During the period 1932 to 1937 a survey[2/] was made of the forest lands of Idaho's 10 northern counties. It was a part of a nationwide project authorized by Congress in 1928. Benewah County was resurveyed in 1943-44 and the resurvey of the other nine counties was made between 1947 and 1951. This work was authorized by Congress to maintain current information on forest resources. The following report summarizes the findings of the resurvey in North Idaho and makes some general comparisons with the initial survey of this area.

1/ North Idaho includes all of the State of Idaho north of the Salmon River.

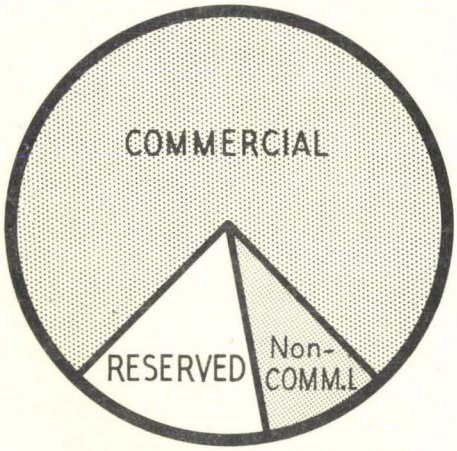
2/ A list of reports published by the forest survey for North Idaho is given on page 37.

81% of North Idaho is forest land



The total land area in North Idaho is 12,600,000 acres. Of this 10,200,000 acres are forest land. Forest predominates in 8 of the 10 North Idaho counties. Two counties, Lewis and Nez Perce, are less than one-third forested.

76% of the forest has commercial value

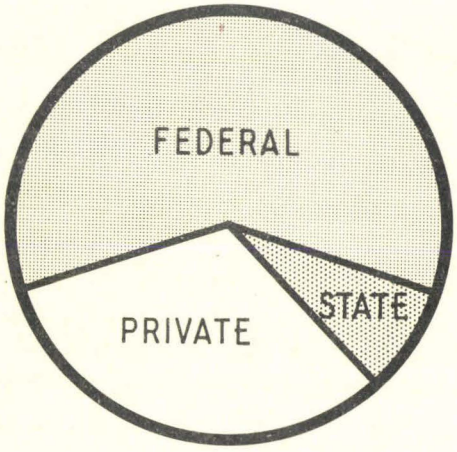


The 10.2 million acres of forest land in North Idaho are classified as follows:

Commercial	76 percent
Noncommercial . .	9 percent
Reserved	15 percent

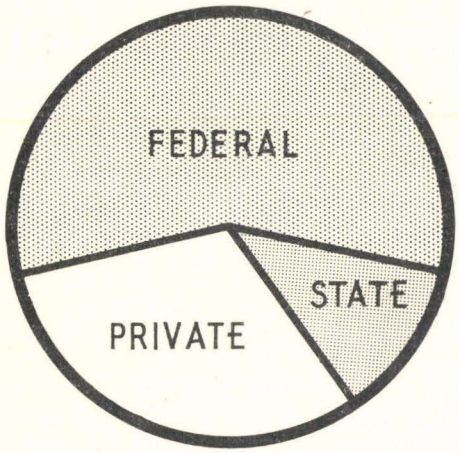
(See table 1 for details of classification.)

60% of the commercial forest is federally owned or managed



Thirty-two percent of the commercial forest is privately owned, including a small area of County lands. The State of Idaho owns 8 percent of the commercial forest. The Forest Service manages 95 percent of the federally owned or managed lands, the Bureau of Land Management 3 percent, and the Indian Service 2 percent.

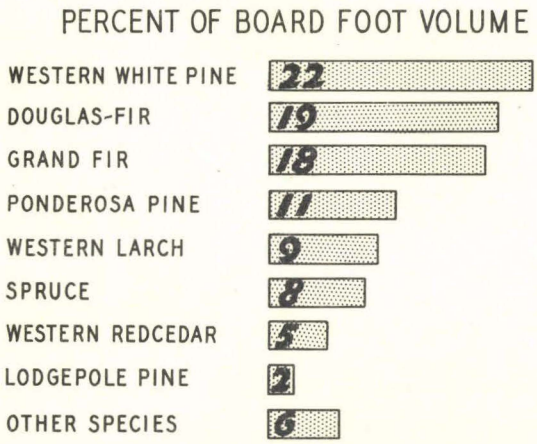
57% of the live sawtimber is on federally owned or managed lands



Thirty-one percent of the total volume of 60,685,000,000 board feet is on private lands. Twelve percent is on State lands. The federally owned or managed sawtimber is broken down as follows:

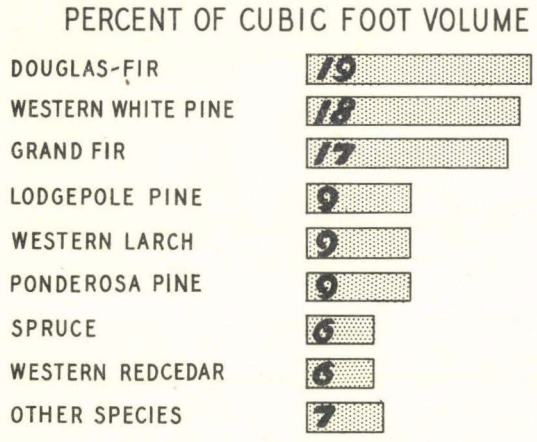
Forest Service . . .	97 percent
Bureau of Land Management	2 percent
Indian Service . . .	1 percent

White pine is the principal sawtimber tree



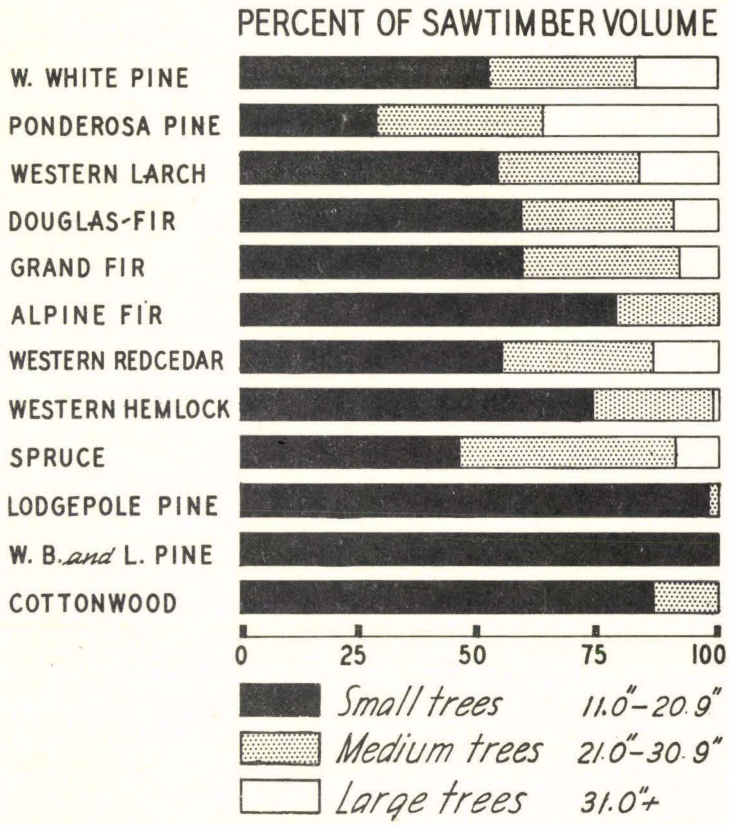
Four species (western white pine, Douglas-fir, grand fir, and ponderosa pine) make up 70 percent of the live sawtimber board-foot volume. Although ponderosa pine represents only 11 percent of the volume, this species totals approximately 21 percent of the sawlogs produced in North Idaho.

Douglas-fir has the largest total volume



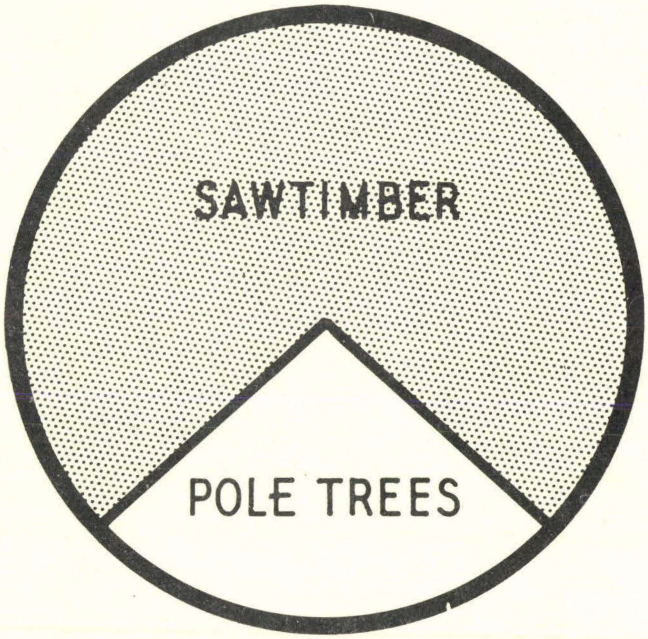
The only major difference in proportions from the above occurs in the case of lodgepole pine. Characteristically a small tree, this species makes up only 2 percent of the sawtimber volume but 9 percent of the total volume of sawtimber and pole size trees.

54% of the total sawtimber volume is in trees below 21 inches in diameter



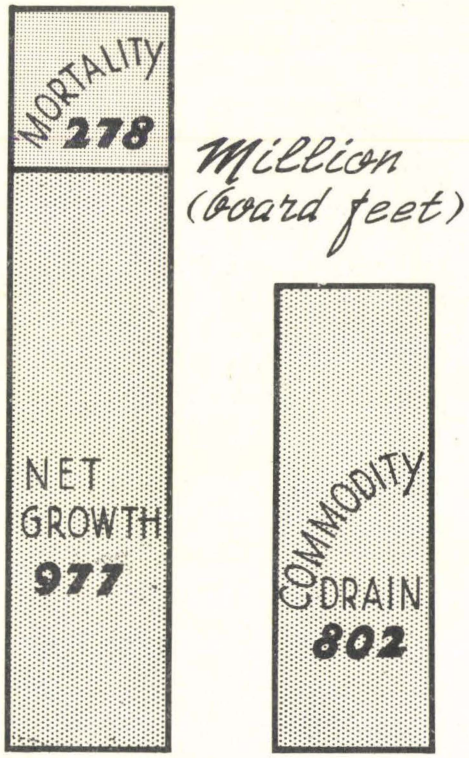
Thirty-two percent of the volume is in trees from 21 to 30.9 inches and 14 percent in trees 31 inches and larger. By species the percentages differ a great deal. For example, 70 percent of the ponderosa pine volume is in medium and large trees. Ninety-nine percent of the lodgepole pine volume and almost 100 percent of the white bark and limber pine volume is in small trees.

74% of the total cubic foot volume is in sawtimber trees



The total timber volume in trees 5.0 inches and larger is 13.2 million cubic feet.

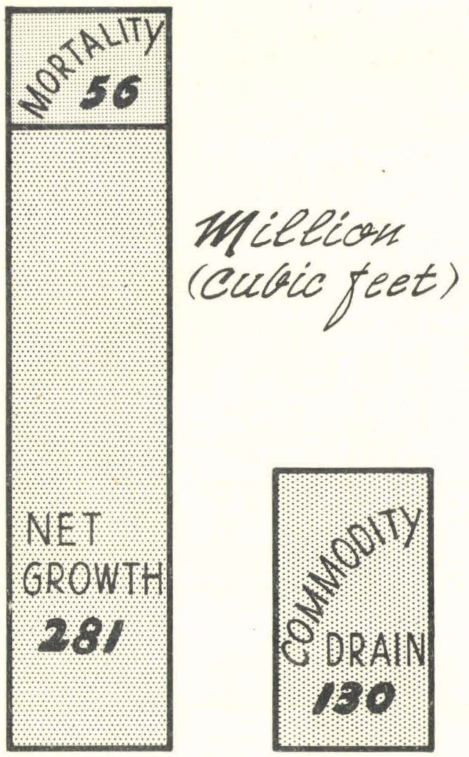
The net sawtimber growth in North Idaho is 22% higher than the cut



If the excessive losses (mortality) could be reduced, there would be even greater opportunities for increasing the cut.

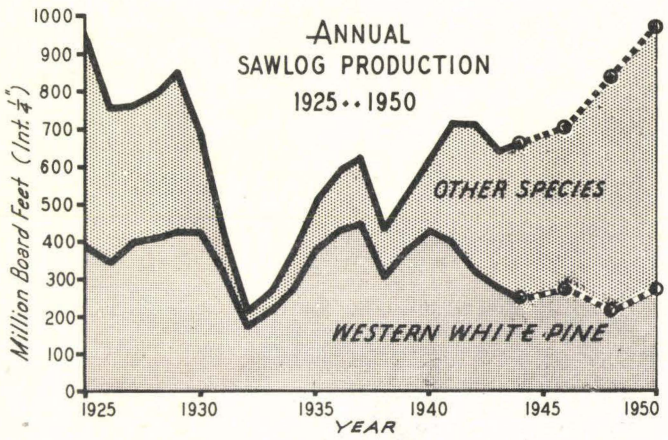
The cut has not been evenly distributed among the species. In general, the drain on white pine and ponderosa pine has exceeded the growth.

The net growth of all trees 5.0 inches in diameter and larger is more than twice as high as the cut



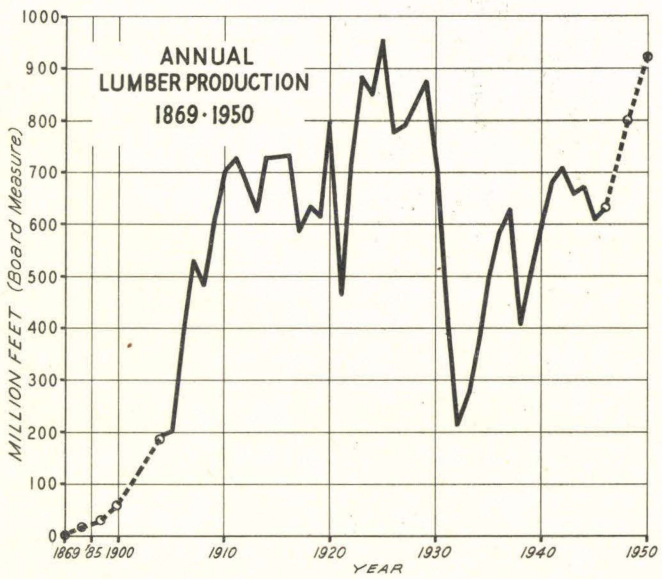
This reflects the fact that a major part of the growth is in pole size trees but practically all of the cut is in sawtimber.

White pine has been the principal species cut in North Idaho



In the decade 1941-1950 38 percent of the sawlog production was white pine, 21 percent ponderosa pine, 18 percent Douglas-fir, 10 percent larch, 10 percent grand fir, and 3 percent other species. Twenty-three sawlog production censuses have been taken since 1925. In only one of these (1948) was white pine production surpassed--then by ponderosa pine.

Lumber production in North Idaho is at record levels



The 1950 sawmill output of 925 million board feet was exceeded only in 1925. An important difference between these two years is that a much smaller proportion of the total output in 1950 was white pine. This is indicated by the upper chart.

COMPARISON OF RESURVEY WITH INITIAL SURVEY

Some of the most significant information forest survey data can show is trends. Comparison of growth and drain data throw some light on trends but in the long run the most revealing comparisons will be between successive inventories. However, two circumstances limit the comparisons which can be made between the original forest survey in North Idaho and this resurvey. One is that a generally tightening wood supply situation has resulted in more critical standards. For example, a considerable area that was once classified as noncommercial has now, because of improved economic conditions, become commercial. The other circumstance is the change of standards made to conform to revised nationwide definitions so that data from the various regions will be comparative and additive. For example, the minimum size for some species of sawtimber trees in this region formerly was 13.0 inches d.b.h. The minimum size for all species is now 11.0 inches. The minimum volume for sawtimber stands was reduced from 4,000 and 3,000 board feet per acre Scribner rule to 1,500 board feet per acre International 1/4-inch rule.

Some broad adjustments have nevertheless been made in the initial forest survey data to make them as comparable as possible with the resurvey. The most important adjustment in the initial survey data was the reclassification of 910,000 acres from the noncommercial to commercial category. Developments in logging and transportation equipment and increased value of wood products make this area presently or potentially operable. Tables 1 and 2 on pages 9 and 10 summarize these comparisons.

The differences between the adjusted initial survey and the resurvey so far as total forest area and commercial forest area are concerned are less than the sampling error limits of the resurvey. Thus the data in themselves indicate no trend. However, the survey transects showed some conversion of commercial forest to cropland and virtually no reversion of cropland to forest. Hence, there has probably been a very small reduction in forest area.

The differences between the two surveys in area figures by stand-size classes likewise is less than the sampling error limits. However, for all types as a group, it is believed that the cutting of sawtimber stands has been offset by the transition of pole stands into sawtimber size. Because of the disproportionately heavy cut of white pine and ponderosa pine the sawtimber area of these types has undoubtedly shrunk.

The resurvey shows a higher proportion of deforested land than was indicated in the initial survey before adjustment. This is because a large part of the area reclassified from noncommercial to commercial is deforested. Also, the resurvey has tallied numerous small openings "washed in" with other stand classes in the initial survey. When account is taken of these factors it appears that the deforested area has actually decreased. The deforested area, nevertheless, is very large and constitutes an obstacle to continued high level production. Much of it is potentially high yielding white pine land. Some of the deforestation dates back to 1910 which indicates the land is not restoring itself very rapidly.

The resurvey shows a larger reserved area than the initial survey. The differences arise from refinements in survey techniques and definitions for there has actually been little change in the reserved area. Better maps are now available, permitting closer delineation of primitive area boundaries. Also, during the resurvey all land, regardless of ownership, lying within the primitive area boundaries was called reserved; the initial survey excluded all private lands so situated.

Sawtimber growth and drain for all species combined on areas presently defined as commercial forest land have been more or less in balance, with the result that the total sawtimber volume in 1952 is about the same as in the middle 1930's. However, because of the disproportionately high cut of white and ponderosa pines, it is reasonable to assume that the volume of these pines has diminished.

Table 1. Estimated differences in area statistics by major land and stand-size class

North Idaho

Survey	Total land area	Forest land										Non-forest land
		Total	Commercial					Other				
			Total	Stand-size class				Total	Nonreserved 1/	Reserved 2/	Reserved 1/	
				Sawtimber	Pole	Seedling-sapling	Deforested					
	Thousand acres											
Initial 3/	12,567	10,330	6,867	2,687	1,799	1,478	903	3,463	1,950	236	1,277	2,237
Initial 4/	12,567	10,243	7,777	3,478	1,735	1,288	1,276	2,466	888	932	646	2,324
Resurvey	12,567	10,226	7,760	3,535	1,891	1,164	1,170	2,466	888	932	646	2,341
Estimated differences 5/												
Thousand acres	0	-17	-17	+57	+156	-124	-106	-	-	-	-	+17
Percent	0	-0.2	-0.2	+1.6	+9.0	-9.6	-8.3	-	-	-	-	+0.7

1/ Forest land incapable of producing commercial timber.
2/ Forest land producing or capable of producing commercial timber.
3/ Initial survey as reported.
4/ Initial survey on as comparable basis as possible with resurvey.
5/ Difference between adjusted initial survey and resurvey.

Table 2. Estimated differences in volume statistics on commercial forest land, North Idaho

	Initial 1/	Resurvey	Estimated differences	
			Volume	Percent
Million board feet	59611	60685	+1074	+ 1.8
Million cubic feet	12864	13210	+ 346	+ 2.7

1/ Initial survey on as comparable basis as possible with resurvey.

Table 3. Land area by major classes of land, North Idaho, 1951

Class of land	Area	Sampling error ±
	--- Thousand acres ---	
Forest		
Commercial	7,760	78
Noncommercial		
Reserved from commercial timber use	932	86
Unproductive for timber use 1/	1,534	
Total	10,226	57
Nonforest 2/	2,341	
Total, all classes	12,567	

1/ Includes 646 thousand acres withdrawn for special uses.

2/ Includes 54 thousand acres of water according to survey standards of area classification but defined by the Bureau of Census as land.

Table 4. Land area by county and major classes of land, North Idaho, 1951

County	Total land area 1/	Forest land					Non-forest land 4/	Percent of total land area in forest land
		Total	Other					
			Commercial	Non-reserved 2/	Reserved 3/	2/		
	Thousand acres							Percent
Benewah	506	404	393	11	-	-	102	79.8
Bonner	1,111	1,000	884	114	2	5/	111	90.0
Boundary	816	737	547	190	-	-	79	90.3
Clearwater	1,614	1,484	1,329	155	-	-	130	91.9
Idaho 6/	4,500	3,729	1,977	176	930	646	771	82.9
Kootenai	804	620	591	29	5/	-	184	77.1
Latah	698	421	417	4	-	-	277	60.3
Lewis	306	94	92	2	-	-	212	30.7
Nez Perce	542	104	101	3	-	-	438	19.2
Shoshone	1,670	1,633	1,429	204	-	-	37	97.8
Total	12,567	10,226	7,760	888	932	646	2,341	81.4

1/ From 1950 U. S. Census.
2/ Forest land incapable of producing commercial timber.
3/ Forest land producing or capable of producing commercial timber.
4/ Includes 54 thousand acres of water according to survey standards of area classification but defined by the Bureau of the Census as land.
5/ Less than 0.5 thousand acres.
6/ Includes only that portion of Idaho County north of the Salmon River.

Table 5. Land area by ownership and major classes of land, North Idaho, 1951

Ownership class	Total land area	Forest land					Non-forest land
		Total	Commercial	Other: Non-reserved 1/	Other: Reserved 2/	Other: Reserved 1/	
	Thousand acres						
Federally owned or managed							
National forest	6,890	6,695	4,418	703	928	646	195
Indian	191	80	74	6	-	-	111
Other	269	198	162	36	-	-	71
Total	7,350	6,973	4,654	745	928	646	377
State	757	708	631	77	-	-	49
Private 3/	4,460	2,545	2,475	66	4/ 4	5/	1,915
Total, all ownerships	6/ 12,567	10,226	7,760	888	932	646	7/ 2,341

1/ Forest land incapable of producing commercial timber.
2/ Forest land producing or capable of producing commercial timber.
3/ Includes a negligible acreage of county- and municipal-owned land.
4/ Private land within the primitive area boundary.
5/ Less than 0.5 thousand acres.
6/ From 1950 U. S. Census.
7/ Includes 54 thousand acres of water according to survey standards of area classification but defined by the Bureau of Census as land.

Table 6. Commercial forest land area, by ownership and stand-size classes, North Idaho, 1951

Ownership class	Total	Stand-size class: Saw-timber	Stand-size class: Pole	Stand-size class: Seedling-sapling	Nonstocked and other areas 1/
	Thousand acres				
Federally owned or managed					
National forest	4418	1912	1094	674	738
Indian	74	29	26	12	7
Other	162	58	56	21	27
Total	4654	1999	1176	707	772
State	631	391	106	74	60
Private 2/					
Farm	851	236	380	134	101
Industrial and other	1624	909	229	249	237
Total	2475	1145	609	383	338
Total, all ownerships	7760	3535	1891	1164	1170

1/ Includes areas not classified elsewhere.

2/ Includes a negligible acreage of county and municipal.

Table 7. Area of commercial forest land by major forest types, North Idaho, 1951

Forest type	Thousand acres
White pine group	
Western white pine 1/	1,920
Cedar	258
Total	2,178
Ponderosa pine	1,109
Western larch	724
Douglas-fir	1,286
Lodgepole pine group	
Lodgepole pine	1,209
Whitebark and limber pine	2/
Total	1,209
Spruce-fir group	
Spruce	214
Hemlock-grand fir	990
Total	1,204
Hardwoods	50
Total, all types	7,760

1/ White pine type requires 20-percent or more volume plurality in white pine species; all other types require 50-percent volume plurality in their respective species.

2/ Less than 0.5 thousand acres.

Table 8. Net volume of live sawtimber and growing stock on commercial forest land, by stand-size class, North Idaho, 1951

Stand-size class	Sawtimber	Growing stock
	Million board feet	Million cubic feet
Sawtimber stands	58,143	10,563
Poletimber stands	2,133	2,420
Seedling-sapling stands	183	178
Nonstocked and other areas not elsewhere classified	226	49
Total, all stands	1/ 60,685	1/ 13,210

1/ Sampling errors on the basis of odds of 2 out of 3 are ± 1687 million board feet for sawtimber, and ± 296 million cubic feet for growing stock.

Table 9. Net volume of live sawtimber and growing stock on commercial forest land, by ownership class, North Idaho, 1951

Ownership class	Sawtimber	Growing stock
	Million board feet	Million cubic feet
Federally owned or managed		
National forest	33,333	7,403
Indian	310	80
Other	860	211
Total	34,503	7,694
State	7,311	1,455
Private 1/		
Farm	4,115	1,046
Industrial and other	14,756	3,015
Total	18,871	4,061
Total, all ownerships	60,685	13,210

1/ Includes a negligible volume in county and municipal.

Table 10. Net volume of live sawtimber and growing stock on commercial forest land by species, North Idaho, 1951

Species	Sawtimber	Growing stock
	Million board feet	Million cubic feet
Softwoods		
Western white pine	13,381	2,389
Ponderosa pine	6,931	1,220
Western larch	5,553	1,232
Douglas-fir	11,390	2,462
Grand fir	10,720	2,186
Alpine fir	1,225	310
Western redcedar	3,098	740
Hemlock 1/	2,191	506
Spruce	4,770	860
Lodgepole pine	1,224	1,249
Whitebark and limber pine	35	12
Total	60,518	13,166
Hardwoods		
Aspen	2/	2/
Cottonwood	167	39
Birch	-	5
Total	167	44
Total, all species	60,685	13,210

1/ Includes 78 million board feet and 18 million cubic feet of mountain hemlock.

2/ Less than 0.5 million feet.

Table 11. Net volume of live sawtimber on commercial forest land by diameter class groups and species, North Idaho, 1951

Species	Diameter class group, d.b.h.				Total
	11.0-20.9"	21.0-30.9"	31.0-40.9"	41.0" & larger	
	Million board feet				
Western white pine	7,015	4,182	1,425	759	13,381
Ponderosa pine	2,082	2,285	2,009	555	6,931
Western larch	2,988	1,668	778	119	5,553
Douglas-fir	6,638	3,785	848	119	11,390
Grand fir	6,238	3,667	764	51	10,720
Alpine fir	983	242	-	-	1,225
Western redcedar	1,682	990	320	106	3,098
Hemlock	1/ 1,622	542	27	-	2,191
Spruce	2,194	2,217	307	52	4,770
Lodgepole pine	1,218	6	-	-	1,224
Whitebark and limber pine	35	2/	-	-	35
Aspen	2/	-	-	-	2/
Cottonwood	143	24	-	-	167
Total	32,838	19,608	6,478	1,761	60,685

1/ Includes 78 million board feet of mountain hemlock.

2/ Less than 0.5 million board feet.

Table 12. Net volume of all timber on commercial forest land, by class of material and species group, North Idaho, 1951

Class of material	Total	Softwood	Hardwood
	Million cubic feet		
Growing stock			
Sawtimber trees:			
Sawlog portion	8,879	8,855	24
Upper stem portion	883	876	7
Total	9,762	9,731	31
Poletimber trees	3,448	3,435	13
Total	13,210	13,166	44
Other material			
Sound cull trees	195	195	-
Rotten cull trees	1,749	1,748	1
Hardwood limbs	1/	-	1/
Salvable dead trees	555	555	-
Total	2,499	2,498	1
Total, all timber	15,709	15,664	45

1/ Less than 0.5 million cubic feet.

Table 13. Live timber volume on commercial forest land by county, North Idaho, 1951

County	Live 1/ saw-timber	Live all timber 2/					
		Growing stock			Cull trees	Hardwood limbs	Total
		Sawtimber trees	Pole trees	Total			
	Million bd. ft.	Million cubic feet					
Benewah	1,946	323	235	558	309	3/	867
Bonner	4,899	806	432	1,238	191	3/	1,429
Boundary	3,725	611	285	896	151	3/	1,047
Clearwater	15,158	2,384	412	2,796	379	-	3,175
Idaho	18,070	2,888	979	3,867	327	3/	4,194
Kootenai	3,320	542	296	838	120	3/	958
Latah	3,240	520	154	674	97	-	771
Lewis	426	70	25	95	9	-	104
Nez Perce	523	88	29	117	12	-	129
Shoshone	9,378	1,530	601	2,131	349	3/	2,480
Total	60,685	9,762	3,448	13,210	1,944	3/	15,154

1/ Trees 11.0" d.b.h. and larger measured by International 1/4" rule.

2/ The volume, excluding bark, of sound trees and the sound volume of cull trees 5.0" d.b.h. and larger from 1-foot stump to a 4.0-inch minimum top diameter including the sound volume of limbwood for hardwood species to a 4.0-inch minimum top diameter.

3/ Less than 0.5 million cubic feet.

Table 14. Net annual growth, annual mortality, and commodity drain on live sawtimber and growing stock on commercial forest land, by species group, North Idaho, 1951

Item	Sawtimber			Growing stock		
	Total	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood
	Million board feet			Million cubic feet		
Net annual growth	977	973	4	281	281	1/
Annual mortality	278	278	1/	56	56	1/
Commodity drain						
Timber products	789	788	1	116	116	1/
Logging waste	13	13	1/	14	14	1/
Total	802	801	1	130	130	1/

1/ Less than 0.5 million feet.

Table 15. Total average[1] output of timber products and commodity drain on live sawtimber and growing stock, North Idaho, 1951

Product	Volume of products cut[2]			Commodity drain on sawtimber			Commodity drain on growing stock		
	Standard unit	Number	Thousand cu.ft.	Total	Soft-wood	Hard-wood	Total	Soft-wood	Hard-wood
				Million bd.ft.			Million cu.ft.		
Sawlogs, veneer logs & bolts	M bd.ft. [3]	782,662	111,913	766	766	[4]	121	121	[4]
Pulpwood logs	"	14,371	2,082	13	12	1	2	2	[4]
Fuelwood	Std.cords[5]	53,000	5	1	1	[4]	[4]	[4]	[4]
Poles	M pieces	189	3,849	13	13	-	4	4	-
Posts	"	1,500	1,620	1	1	-	[4]	[4]	-
Hewn ties	"	5	18	[4]	[4]	-	[4]	[4]	-
Mine timbers	M cu.ft.	1,869	1,869	5	5	-	2	2	-
Shingle bolts	"	482	482	3	3	-	1	1	-
Total	xxxx	xxxxx	121,838	802	801	1	130	130	[4]

1/ Average output for poles is based on annual estimates of 1946 through 1950. Estimates for 1942, 1944, 1946, 1948, and 1950 were used for all other products.
2/ Includes material from both growing stock and other miscellaneous sources.
3/ International 1/4-inch rule.
4/ Less than 0.5 million feet.
5/ Rough wood basis.

Table 16. Annual sawlog production,[1] North Idaho, 1925-1950

Year	Western white pine	Ponderosa pine	Western larch	Douglas-fir	Grand fir	Western red-cedar	Spruce	Other	Total
	Million board feet, International 1/4" rule								
1925	384	233	96	91	79	33	21	4	941
1926	348	187	62	63	52	21	16	6	755
1927	401	156	82	52	47	16	4	3	761
1928	409	154	70	79	61	11	7	3	794
1929	429	181	72	79	76	11	5	2	855
1930	424	122	47	40	43	6	5	1	688
1931	321	40	15	12	21	3	3	2	417
1932	176	19	9	9	3	1	1	2/	218
1933	217	21	11	11	3	1	2	2/	266
1934	274	49	14	22	6	1	1	10	377
1935	379	71	18	21	12	4	4	2/	509
1936	435	81	23	31	11	3	6	1	591
1937	450	95	26	31	13	4	3	2	624
1938	307	64	19	23	17	5	2	1	438
1939	379	71	25	28	13	6	4	2	528
1940	431	88	28	41	15	7	7	1	618
1941	403	134	33	91	39	10	5	2	717
1942	320	132	49	140	58	9	5	1	714
1943	278	109	53	120	68	5	6	3	642
1944	247	143	63	116	72	11	7	4	663
1946	276	126	81	103	90	19	6	5	706
1948	215	233	116	150	100	22	10	1	847
1950	275	218	108	206	118	31	16	3	975

1/ Items in this table are not comparable with lumber production shown in the following table because some sawlogs produced in North Idaho were milled in either Washington or Montana, and vice versa, and because of overrun.

2/ Less than 0.5 million board feet.

Table 17. Annual lumber production reported in North Idaho by species, for specified years, 1869-1950

Year 1/	Western white pine	Ponderosa pine	Douglas-fir	Western larch	Grand fir	Spruce	Western red-cedar	Western hemlock	Lodgepole pine	Cotton-wood 2/	Other 3/	Total
	Thousand feet, board measure											
1869	-	1,820	-	-	-	-	-	-	-	-	-	1,820
1879	-	15,470	840	-	-	-	-	-	-	-	-	16,310
1889	3,000	22,750	2,520	-	-	-	-	-	-	-	-	28,270
1899	1,990	48,039	4,171	-	-	-	2,100	-	-	-	-	56,300
1904	13,155	119,325	25,914	3,149	-	-	10,835	-	-	-	21,000	193,378
1905	62,453	76,112	8,549	9,685	-	125	15,560	1,525	-	5,224	22,500	201,733
1906	84,314	191,377	29,123	37,992	10,304	2,169	27,736	4,019	-	2,610	-	389,644
1907	79,518	234,939	61,481	53,943	77,928	854	17,087	2,424	-	2,305	-	530,479
1908	115,761	190,461	50,686	73,032	10,774	862	39,280	850	-	3,519	570	485,795
1909	169,403	231,397	53,650	93,833	22,339	557	28,644	1,165	159	5,228	84	606,459
1910	232,442	255,285	52,746	96,491	24,761	413	38,831	3,423	121	392	-	704,905
1911	297,056	200,733	64,810	93,689	33,559	397	35,083	2,010	104	319	-	727,760
1912	309,564	163,675	43,550	106,567	15,113	475	35,165	7,340	106	1,519	-	683,074
1913	227,845	161,710	56,374	114,925	27,666	152	23,307	6,505	131	845	-	619,460
1914	280,608	145,453	80,911	104,441	42,983	181	61,041	11,891	96	42	-	727,647
1915	301,600	183,690	64,078	106,891	42,048	1,143	29,654	1,345	137	998	-	731,584
1916	304,055	165,545	67,202	103,514	49,137	6,633	35,981	27	273	1,389	-	733,756
1917	193,404	177,918	45,086	98,950	36,627	18,770	15,319	1,325	146	473	-	588,018
1918	208,749	173,424	46,246	116,691	49,644	12,360	26,810	204	50	261	-	634,439
1919	234,207	135,170	24,930	140,805	46,504	5,417	26,165	1,918	-	306	-	615,422
1920	261,251	229,853	72,584	138,787	53,319	9,822	26,663	120	60	1,376	-	793,835
1921	167,300	138,365	41,024	70,728	22,930	9,671	13,872	15	11	916	-	464,832
1922	297,970	198,276	51,076	89,627	55,828	12,965	20,269	50	50	44	-	726,155
1923	374,385	234,766	67,824	121,160	47,614	9,958	25,930	1,021	6	711	-	883,375
1924	375,775	225,744	78,453	88,773	43,669	10,563	25,022	1,281	70	826	-	850,176
1925	389,267	236,540	99,492	104,210	66,484	21,322	34,377	2,485	33	465	-	954,675
1926	348,813	182,086	74,000	71,143	58,360	16,323	24,343	2,744	19	202	-	778,033
1927	410,252	147,360	59,042	96,355	51,897	4,460	16,789	2,228	37	487	-	788,907
1928	424,049	142,783	92,854	81,460	67,694	6,991	11,879	2,110	22	207	-	830,049
1929	437,568	167,758	89,640	81,538	80,403	5,416	12,047	1,418	3	57	-	875,848
1930	432,438	123,309	47,978	54,753	49,397	5,357	7,614	332	27	450	-	721,655
1931	316,115	35,523	16,263	18,227	25,556	2,452	2,463	845	-	18	-	417,462
1932	169,425	14,660	10,460	10,818	3,191	947	739	2	20	2	-	210,264
1933	219,577	13,660	12,859	13,532	4,839	1,701	719	410	30	11	-	267,338
1934	289,848	27,513	23,613	14,971	7,525	924	1,542	11	13	-	-	365,960
1935	374,401	53,468	23,337	20,135	14,058	4,560	1,519	358	21	6	-	491,863
1936	441,865	64,511	32,209	23,560	11,703	4,836	3,119	1,168	22	4	-	582,997
1937	459,661	79,993	35,410	29,075	16,118	2,636	5,088	911	57	30	-	628,979
1938	286,767	50,914	24,353	20,216	16,604	1,521	4,617	829	168	-	-	405,989
1939	365,540	56,271	31,401	24,464	15,204	3,393	6,241	1,979	10	-	-	504,503
1940	421,698	71,842	42,819	27,598	15,953	5,381	7,534	982	37	-	-	593,844
1941	386,714	116,276	92,866	31,418	36,865	4,281	11,738	2,047	115	3	-	682,323
1942	321,541	133,038	135,793	39,591	62,319	5,269	9,527	428	169	100	-	707,775
1943	298,608	105,692	120,101	47,388	72,566	5,853	5,607	2,026	36	-	-	657,877
1944	254,171	141,449	118,433	59,866	76,108	6,421	11,876	2,953	14	814	-	672,105
1945	220,321	125,422	110,732	46,982	84,621	6,341	15,485	1,105	176	10	3	611,198
1946	214,130	127,245	104,134	70,586	84,647	5,747	19,293	3,780	66	383	1	630,012
1948	225,102	191,085	147,880	86,850	106,887	8,961	17,888	1,807	95	-	-	786,555
1950	287,657	178,654	202,493	80,529	125,776	15,300	25,717	8,686	339	11	-	925,162

1/ Mills cutting less than 50 M feet annually not included for years 1869 to 1919, inclusive.

2/ Cottonwood not reported as separate species prior to 1905.

3/ Mostly softwoods.

Table 18. Annual pulpwood production--sawlogs, North Idaho, 1935-1950

Species	1935	1936	1937	1938	1939	1940	1941	1942
	Thousand board feet, International 1/4" rule							
Grand fir	3,760	18,516	13,522	5,367	8,207	11,054	6,815	3,843
Spruce	243	4,096	6,660	6,384	1,885	924	1,953	50
Western hemlock	711	2,722	711	864	1,369	2,544	1,229	566
Cottonwood	1,128	-	208	810	492	516	955	1,444
Total	5,842	25,334	21,101	13,425	11,953	15,038	10,952	5,903

Species	1943	1944	1945	1946	1947	1948	1949	1950
	Thousand board feet, International 1/4" rule							
Grand fir	2,462	9,977	8,883	6,357	19,823	13,810	12,300	5,088
Spruce	2,959	2,737	92	1,129	1,587	554	2,539	1,156
Western hemlock	4,031	4,710	10,658	7,217	11,157	3,170	5,439	8,410
Cottonwood	361	882	503	286	636	8	43	345
Total	9,813	18,306	20,136	14,989	33,203	17,542	20,321	14,999

Table 19. Annual pole production, North Idaho, 1946-1951

Species	1946	1947	1948	1949	1950	1951
	Number of poles					
Western redcedar	163,503	150,774	164,691	241,639	151,850	134,040
Western larch	47,460	85,702	28,366	55,639	27,170	56,222
Lodgepole pine	31,929	30,020	11,631	1,651	1,200	41
Douglas-fir	5,419	568	347	1,879	190	3,038
Western white pine	390	-	-	-	-	-
Ponderosa pine	21	-	-	-	-	-
Total	248,722	267,064	205,035	300,808	180,410	193,341

Table 20. Per-acre volume of live sawtimber on commercial forest land by stand-size class, North Idaho, 1951

Stand-size class	Thousand acres	Million board feet 1/	Board feet per acre
Sawtimber	3,535	58,143	16,448
Pole	1,891	2,133	1,128
Seedling-sapling	1,164	183	157
Nonstocked	1,170	226	193
Total	7,760	60,685	7,820

1/ International 1/4" rule.

Table 21. Per-acre volume of growing stock on commercial forest land by stand- and tree-size classes, North Idaho, 1951

Stand-size class	Thousand acres	Trees			Trees		
		Saw-timber	Pole	All	Saw-timber	Pole	All
		Million cubic feet			Cubic feet per acre		
Sawtimber	3,535	9,314	1,249	10,563	2,635	353	2,988
Pole	1,891	377	2,043	2,420	199	1,081	1,280
Seedling-sapling	1,164	31	147	178	27	126	153
Nonstocked	1,170	40	9	49	34	8	42
Total	7,760	9,762	3,448	13,210	1,258	444	1,702

FOREST SURVEY METHOD

Area and Volume

Initial survey. The initial survey of North Idaho was made during the years 1932 to 1937 by the "compilation" method as follows: The boundaries of non-forest land and forest land classified by type, stand-size, stocking, age, and site classes were delineated on 2-inch-to-the-mile base maps as precisely as possible from intensive cruise data, county assessment records, cutting and fire records, and other available sources. Stand characteristics, such as age and site, which could not be determined from available records, along with some missing data, were determined by field examination in connection with an over-all check of all data. Forest cover classifications were based on prevailing conditions on areas of generally 40 acres or more.

From 2-inch-to-the-mile townships maps the area of the various cover classes within each ownership was computed by planimeter or 10-acre square count. The area data were tabulated by Land Office sections and summarized by ownership, classification, and county. The possible number of classes for commercial forest land alone were 10 (types) x 3 (stand-size classes) x 3 (stocking classes) x 6 (age classes) x 5 (site classes) or 2700.

Timber volume was estimated for each commercial forest delineation either from intensive cruises adjusted to a common standard, field samples, ocular estimates, or modified normal yields correlated with type, stocking, age, and site classes.

Resurvey. Although the initial survey gave very detailed and localized statistics on the forest resource, the cost of repeating periodically such a survey to obtain current statistics would be prohibitive. To offset this cost a sampling method was designed and followed---with some variations---for all of the ten counties in North Idaho.

In resurveying eight of the counties (the design varied for Benewah and Idaho Counties), the areas of nonforest and forest land with various subclasses were derived by correlating initial survey area data with forest cover observed along sample transects. The transects were run in a random direction to and from Land Office section corners spaced at 4-mile intervals. Cover conditions were observed, classified, and recorded on a strip two chains wide; a 2x2 chain or 0.4-acre unit being the minimum area considered in the classification.

The transect courses were plotted on the initial survey type maps. The total area of each initial survey classification was reclassified in accordance with the composition indicated by the transect sample for that classification.

For volume determination a location, consisting of three 1/5-acre sample plots, was established at each Land Office section corner which controlled the line transects. The measurements from these plots

provided the basis for the mean-acre volumes by classes. Total volume estimates were derived by applying the mean-volume estimates to the revised acres by classes.

The resurvey area and volume statistics for the eight counties are based on the initial survey cover-type area modified by sample line transects and volume sample plots shown in the following table:

County	Area	Volume
	Chains of transect	Number of plots
Bonner	1620.0	282
Boundary	1921.0	198
Clearwater	2090.0	408
Kootenai	858.5	198
Latah	607.0	135
Lewis	174.5	42
Nez Perce	259.0	54
Shoshone	1732.0	414
Total	9262.0	1731

Transect courses, location of section corners and plots, and other information were recorded on available aerial photographs and field forms to facilitate relocation and future measurements.

The 1943-44 resurvey in Benewah County consisted of collecting data on about 4000 1/20-acre sample plots five chains apart along parallel cruise lines spaced three miles apart and disposed in a north-south direction. A six-year adjustment for cutting and growth was applied to the resurvey estimates to bring Benewah County statistics up to a comparable date with the other counties in North Idaho.

In resurveying Idaho County a complete new cover type map was made. The mapping was done in the field on aerial photographs and later transferred to 2-inch-to-the-mile township maps. As in the initial survey the area was classified by nonforest land and forest land with subclasses by type, stand-size, stocking, age, and site classes. Finally, the various cover classes were tabulated by ownership and summarized.

For volume estimates in Idaho County the method was similar to that of the eight counties already described with the exception that only two 1/5-acre sample plots were measured at each location. A total of 237 locations, or 474 sample plots, were measured.

Growth

Gross and net growth were derived from increment borings of 1513 sample trees and mortality tallies on each sample plot measured for

inventory purposes. Three sample-plot sizes were used to measure growth: 1/500 acre for trees 5.0 inches to 10.9 inches d.b.h., 1/50 acre for trees 11.0 inches to 24.9 inches d.b.h. and 1/5 acre for trees 25.0 inches d.b.h. and larger. In Idaho County the maximum for the 1/50 acre was 30.9 inches d.b.h. and the 1/5-acre plot included all trees 31.0 inches d.b.h. and larger. Radial growth was determined for the 10-year period preceding the date of field examination. Radial growth was converted to volume growth by subtracting the reconstructed volume of sample trees 10 years ago, taking into account changes in height and bark thickness as well as diameter, from current sample tree volume. For the total growth determination sample trees were divided into two classes: (1) ingrowth trees, those that either developed from sapling into pole size or that grew out of pole size into sawtimber size, and (2) main-growth trees, those that remained either of pole size or of sawtimber size during the growth-study decade. Main-growth percents were calculated and applied to total inventory volumes by stand-size, species, and diameter-class groups. The gross growth was modified by reductions for cull and mortality, and by additions for ingrowth and growth on cut trees.

Mortality

Mortality was based on a tally of trees judged to have died during the last half of the growth-study period (5 years) on each 1/5-acre plot sampled for inventory. The five-year mortality was doubled to obtain estimated mortality for the entire growth-study period.

Commodity Drain

The statistics on commodity drain are based chiefly on the reports of producing or consuming industries, with adjustments for waste as determined from woods and mill-scale studies.

ACCURACY OF ESTIMATES

In determining the area, volume, and growth of the various cover types and species there are two possible sources of error: (1) human errors in classifying the cover of field samples, in measurements on sample plots, and in compiling the field data, and bias resulting from the improper construction, selection, and use of tree-volume tables; (2) sampling errors. The former result from mistakes of judgment or technique and from the complexity of the cover which often grades from one class into another with no clearly defined boundaries. It is seldom possible to evaluate such errors. An effort was made to maintain a high order of accuracy and uniformity of standards in the classification, collection, and compilation of sample data by field checks, by a continuing program of training, and by cross-checks in the office.

Sampling errors (standard errors), on the other hand, do not involve human errors, but rather are theoretical measures of the reliability of estimates based on the variability of sample measurements. For a given condition they vary inversely with the square root of the number

of samples and directly with the square root of the unsampled part of the total population. Hence, they can be controlled by altering either the number of samples, the size of individual samples, or both.

Since the percentage error increases with each subdivision of the total, small acreages or volumes may have large errors and may therefore indicate only relative magnitudes.

Area

Area estimates for the part covered by complete survey have no sampling errors. For the part covered by sampling, the probabilities are 2 out of 3 that sampling errors are within the following limits:

	Estimated area	Standard error	
	Acres	Acres	Percent
Commercial forest land	5,783,000	±78,000	± 1.3
Noncommercial and reserved forest land.....	714,000	±86,000	±12.0
Total forest land	6,497,000	±57,000	± 0.9

For North Idaho as a whole, considering sampling and technique errors for the sampled area and technique errors for the area covered by complete survey, it is judged that actual areas lie between the following limits:

	Thousand acres
Commercial forest land	7,682- 7,838
Noncommercial and reserved forest land ..	2,380- 2,552
Total forest land	10,169-10,283

Volume

Volume sampling errors, after properly adjusting for sampling errors in area determination, are:

Growing stock		Live sawtimber	
Million cubic feet	Percent	Million board feet	Percent
± 296	± 2.2	± 1687	± 2.8

The true volumes for North Idaho are estimated to be within the following limits:

Growing stock ..... 12.9 - 13.5 billion cubic feet
Live sawtimber ..... 59.0 - 62.4 billion board feet

Growth

For the area sampled, standard errors of net annual growth are:

Growing stock		Live sawtimber	
Million cubic feet	Percent	Million board feet	Percent
All species ± 33	± 11.7	± 152	± 15.6

Commodity Drain

Estimates of commodity drain are based chiefly on a complete tabulation of production and consumption statistics, adjusted for waste on the basis of woods and mill studies. Only 23 percent of the cubic-foot and 21 percent of the board-foot drain are based on sampling. However, the translation of production statistics into drain introduces an indeterminable error.

The average annual commodity drain estimates for North Idaho are judged to lie between the following limits:

All species	Growing stock	123-139 million cubic feet
	Live sawtimber	777-841 million board feet

DEFINITIONS

Forest Land Classes

1. Forest land. Includes (a) lands at least 10-percent stocked by trees of any size and capable of producing timber or other wood products, or of exerting an influence on the climate or on the water regime; (b) lands from which the trees described in (a) have been removed to less than 10-percent stocking and which have not been developed for other use; and (c) afforested areas. The minimum area for forest-land classification was 10 acres with a minimum width of 120 feet.

2. Commercial forest land. Forest land which is (a) producing, or is physically capable of producing, usable crops of wood (usually sawtimber), (b) economically available now or prospectively, and (c) not withdrawn from timber utilization.

3. Noncommercial forest land. Forest land incapable of yielding usable wood products (usually sawtimber) because of adverse site conditions, or so physically inaccessible as to be permanently unavailable economically and not withdrawn for special purposes.

4. Reserved forest land. Forest land that has been withdrawn from timber utilization through statute, ordinance, or administrative order.

   a. Reserved commercial forest land. Reserved forest land that otherwise qualifies as commercial forest land.

   b. Reserved noncommercial forest land. Reserved forest land that otherwise qualifies as noncommercial forest land.

Forest Stand-Size Classes

1. Sawtimber stands. All stands with sawtimber trees of softwoods and/or hardwoods having a minimum volume of 1500 board feet per acre, International 1/4-inch rule.

2. Poletimber stands. Stands failing to meet the sawtimber stands specification, but at least 10-percent stocked with poletimber and larger (5.0 inches d.b.h. and larger) trees, and with at least half the minimum stocking in poletimber trees.

3. Seedlings and sapling stands. Forest stands not qualifying as either sawtimber or poletimber stands, but having at least 10-percent stocking of trees and with at least half the minimum stocking in seedlings and saplings.

4. Nonstocked and other areas not elsewhere classified. Areas not qualifying as sawtimber, poletimber, or seedling-sapling stands.

Forest Type Classes

1. White pine group:

   a. White pine. Forests in which 20 percent or more of the stand is western white pine.

   b. Western redcedar. Forests in which 50 percent or more of the stand is western redcedar and less than 20 percent is western white pine.

2. Ponderosa pine: Forests in which 50 percent or more of the stand is ponderosa pine and less than 20 percent is western white pine.

3. Larch: Forests in which 50 percent or more of the stand is larch and less than 20 percent is western white pine.

4. Douglas-fir: Forests in which 50 percent or more of the stand is Douglas-fir and less than 20 percent is western white pine.

5. Lodgepole pine group:

   a. Lodgepole pine. Forests in which 50 percent or more of the stand is lodgepole pine and less than 20 percent is western white pine.

   b. Whitebark and limber pine. Forests in which 50 percent or more of the stand is whitebark and/or limber pine and less than 20 percent is western white pine.

6. Spruce-fir group:

   a. Spruce. Forests in which 50 percent or more of the stand is Engelmann spruce and less than 20 percent is western white pine.

   b. Hemlock-grand fir. Forests in which 50 percent or more of the volume is hemlock, grand fir, or alpine fir, singly or in combination, and less than 20 percent is western white pine.

7. Hardwoods: Forests in which 50 percent or more of the stand is hardwood species and less than 20 percent is western white pine.

Ownership Classes

1. National forest ownership. Federal lands which, by executive order or statute, have been designated as national forests, purchase units, or experimental areas, or have been placed under the administration of the Forest Service.

2. Indian ownership. Indian tribal lands and trust allotments. Lands held in fee by the Federal Government but administered and managed for Indian tribal groups, or allotted in trust to individual Indians.

3. Other Federal ownership. Lands owned by the Federal Government not classed as national forest or Indian.

4. State ownership. Lands in state ownership.

5. Private ownership. Lands in private ownership.

   a. Private farm ownership. Private commercial forest land in farms, using as the definition of "farm" the official definition in the latest Census of Agriculture.

   b. Other private ownership. Commercial forest land in private ownership other than farm.

Tree-Merchantability Classes (Live)

1. Merchantable sawtimber trees. Live white pine sawtimber trees in which the merchantable portion is 33 percent or more of the total board-foot volume, live sawtimber trees of other species that are at least 50 percent merchantable by board-foot volume.

2. Cull sawtimber trees. Live white pine sawtimber trees in which the unmerchantable portion exceeds 67 percent, and live sawtimber trees of other species in which the deduction for cull exceeds 50 percent of total board-foot volume.

   a. Sound cull sawtimber trees. Live sawtimber trees in which the unmerchantable portion results from defect other than rot; for example, sweep, frost crack, extreme roughness, fire scar, etc.

   b. Rotten cull sawtimber trees. Live sawtimber trees in which the unmerchantable portion results from decay organisms.

3. Merchantable poletimber trees. Live poletimber trees of all species that are judged to be prospectively merchantable for sawlogs.

4. Cull poletimber trees. Live poletimber trees of all species that are judged to be prospectively unmerchantable for sawlogs.

   a. Sound cull poletimber trees. Live poletimber trees judged unmerchantable now or prospectively because of defect other than rot.

   b. Rotten cull poletimber trees. Live poletimber trees judged unmerchantable now or prospectively because of rot.

Tree Merchantability Classes (Dead)

1. Salvable dead sawtimber trees. Dead, standing or down, sawtimber trees of all species having a merchantable volume of 50 percent or more of the total board-foot volume.

2. Salvable dead poletimber trees. Dead, standing or down, poletimber trees of all species with 50 percent or more of the cubic volume merchantable.

Tree-Size Classes

1. Sawtimber trees. Trees 11.0 inches d.b.h. and larger with one or more merchantable 16-foot sawlogs.

2. Poletimber trees. Trees ranging from 5.0 through 10.9 inches d.b.h. and trees in the 12-inch class that because of taper and form contain only one 16-foot log and that log is now unmerchantable.

3. Seedling and sapling trees. Trees smaller than 5.0 inches d.b.h.

Miscellaneous Definitions

1. Live sawtimber volume. Net volume in board feet, International 1/4-inch rule, of merchantable sawtimber trees.

2. Growing stock volume. Net volume, in cubic feet, of merchantable sawtimber trees, and merchantable poletimber trees from stump to a minimum 4.0-inch top (of central stem) inside bark.

3. Other material. Net volume, in cubic feet, of all live cull and salvable dead trees of all species from stump to a minimum 4.0-inch top (of central stem) inside bark, and limbs to a 4.0-inch top diameter inside bark of all live cull and noncull hardwood trees.

4. Live all-timber volume. Net volume, in cubic feet, of growing stock, all live cull trees, and hardwood limbs.

5. All-timber volume. Net volume in cubic feet of growing stock and other material.

6. Sawlog portion. Net volume, in cubic feet, of merchantable sawtimber trees from stump to a merchantable sawlog top. Tops vary by species and diameter class, ranging from 6.0 inches for small trees up to 22.0 inches for very large rough trees.

7. Upper stem portion. The net cubic-foot volume of merchantable sawtimber trees from the merchantable sawlog top to 4.0 inches inside bark.

8. Net board-foot volume. The board-foot volume of the sawlog portion of merchantable sawtimber trees, as measured by International 1/4-inch rule.

9. Net cubic volume. The total cubic-foot volume discounted for unmerchantable material. Includes the merchantable portion only of sound, sound cull, and rotten cull sawtimber and poletimber trees and hardwood limbs larger than 4.0-inch top diameter.

10. Net annual growth. The average annual change during a specified period in volume of growing stock on commercial forest land resulting from natural causes. Gross growth is the increment before allowance for mortality.

11. Net annual mortality. The average annual volume removed from growing stock on commercial forest land during a specified period through death from natural causes.

12. Commodity production. The total output of timber products during a specified period.

13. Commodity drain. The timber volume removed from growing stock as timber products and logging waste during a specified period.

14. Logging waste. The net volume of growing stock cut or killed by logging on commercial forest land and not converted to timber products.

15. Timber products from miscellaneous sources. The volume of timber products cut from cull trees, limbs, dead trees, timber from noncommercial and nonforest land, and overutilization of growing stock.

16. D.b.h. (diameter breast high). Tree diameter in inches, outside bark, measured $4\frac{1}{2}$ feet above average ground level.

LIST OF FOREST SURVEY REPORTS FOR NORTH IDAHO

No.	Forest Survey Statistical Service Series
1	Forest statistics for northern Idaho, 1941
	Forest Survey Releases
6	Forest statistics for Boundary County, Idaho, 1937
7	Forest statistics for Bonner County, Idaho, 1937
8	Forest statistics for Benewah County, Idaho, 1937
9	Forest statistics for Kootenai County, Idaho, 1937
10	Forest statistics for Latah County, Idaho, 1938
11	Forest statistics for Shoshone County, Idaho, 1938
12	Forest statistics for Nez Perce County, Idaho, 1938
13	Forest statistics for Lewis County, Idaho, 1938
14	Forest statistics for Clearwater County, Idaho, 1938
15	Forest statistics for Idaho County, Idaho, 1938
16	Western redcedar pole resources in North Idaho and in Northeastern Washington, 1939
18	Forest increment in North Idaho, 1940
19	Northern Idaho's forest problem, 1941
	Station Papers
6	Changes in Benewah County forest statistics, 1947
	Miscellaneous Publications
508	Northern Idaho forest resources and industries, 1942